Hail damage in Iowa

[Reported by township assessors]

Year	Damage and risk			Area of damage		Largest county damage		Largest township damage		Counties reporting no damage
	Total damage in State	Total amount at risk	Per cent of damage	Number of townships reporting damage	Per cent of all townships in State	Amount	County	Amount	Township and county	
1923	$2,319,507	$382,987,102	0.61	451	28.0	$233,336	Poweshiek	$70,094	Bear Creek, Poweshiek County.	Dallas, Davis, Des Moines, Dickinson, Guthrie, Jefferson, Lee, Louisa, Van Buren, Washington, Wayne.
1924	6,903,909	422,087,377	1.64	598	37.1	690,259	Keokuk	321,380	Liberty Keokuk County.	Monroe, Wayne.
1925	7,975,686	401,371,307	1.99	748	46.5	592,800	do	189,230	English River, Keokuk County.	Davis.
1926	2,342,187	355,664,129	0.66	465	28.9	415,020	Webster	175,225	Roland, Webster County.	Iowa.
1927	5,064,717	380,753,693	1.33	664	41.2	442,305	Clinton	155,150	Eden, Clinton County	Davis, Dubuque.
1928	6,363,932	439,206,488	1.45	779	48.4	558,966	Plymouth	189,147	Magnolia, Harrison County.	Henry, Jefferson, Louisa, Van Buren.
1929	3,541,179	429,093,048	0.83	387	24.1	1,076,280	Sioux	203,400	Lincoln, Sioux County.	Clay, Davis, Des Moines, Lee, Marion, Palo Alto, Wayne, Winnebago.
1930	1,598,963	*320,704,507	0.50	410	25.5	551,818	Woodbury	83,532	Liston, Woodbury County.	Clarke, Clinton, Dallas, Des Moines, Henry, Jefferson, Jones, Lee, Mahaska, Mills, Monroe, Van Buren.
Average	4,513,760	391,483,456	1.15	563	35.0	570,098		173,395		

*Amount at risk, 1930, preliminary estimate, subject to change.

MELON FROST FORECASTING IN THE UMPQUA VALLEY, OREG.

By EDGAR H. FLETCHER

[Weather Bureau Office, Roseburg, Oreg., April 27, 1931]

INTRODUCTION

Since it occurs to the writer that forecasting frost for the benefit of commercial cantaloupe growing may be a rather new departure in the field of frost protection, a brief outline of the practical application of this service to the melon industry in the Umpqua Valley is presented, with special reference to the part played by fog formation.

CONDITIONS FAVORABLE FOR CANTALOUPE PRODUCTION

The lowlands in the isolated valleys along the South Umpqua River in the general vicinity of Roseburg, Oreg., are being utilized for the growing of cantaloupes of superior quality. The three factors of primary importance—soil, temperature, and moisture—upon which the successful growing of cantaloupes depend are properly correlated here to produce quality and quantity.

The soil of these bottom lands is of silty loam, from 10 to 15 feet deep on gravel through which the river runs, and with a water table so high as to preclude the necessity of irrigation. The vines root down 5 or 6 feet and depend on subsoils moisture, which is supplied by generous winter rains, the summer season being almost rainless. Thus the unirrigated growth, together with the long growing season of cool nights and warm days, not only develops an extremely high sugar content but improves the flavor and keeping qualities, so that melons can be picked fully ripe for shipment almost any distance. The best and finest flavored crops are grown in the years when no rain falls from the time of germination to the end of harvest.

FROST PROTECTION NEEDED

The harvesting season begins about August 15 and continues through the greater part of October. But there is the ever-present danger of frost during the second half of this period; and since it is in the second half that all the growers' profits lie, it stands the grower who wishes to safeguard his season's labor and results therefrom well in hand to consider some method of frost control, especially since the vines will continue to produce until killed by frost.

Experiments, though somewhat crude, in the fall of 1929 clearly demonstrated the fact that frost-control work can be successfully and profitably accomplished on late-maturing melon fields. It occasionally happens that an early fall frost occurs when a large portion of the crop is still unmatured. To protect against a single September frost may be the means of prolonging the growing season for two or three weeks, and just at the time when the market is becoming more favorable. After the coming of the fall rains there is usually sufficient soil moisture to produce fog in the early mornings on radiation nights, thus affording a natural protection against frost damage. But frost hazard is great under any barometric condition with low atmospheric moisture and clear nights.

EFFECT OF WIND

The wind movement, being extremely light in these more or less inclosed valleys, is not usually an important factor to be considered; neither is air drainage, as the valley surfaces are nearly level. However, a change in wind direction during the night to northerly or easterly has the effect of lowering the dew point and consequently preventing the formation of fog which may have been indicated at 5 p. m., especially if clearing does not occur until after that hour.

FOG AN IMPORTANT FACTOR

An essential prerequisite to frost and minimum temperature forcasting in this region is the foretelling of the occurrence of morning fog, together with the degree of density, and the approximate hour of beginning, since occasionally there will be some damage before the fog begins to retard the fall in temperature.

Fog conditions can be determined with great accuracy from the 5 p. m. dew point and relative humidity in connection with the chart shown in Figure 1. This chart shows under what values of 5 p. m. dew point and relative humidity fog has occurred on radiation nights for the fall season at Roseburg during the past 22 years when the minimum temperature was 40° or below. In using the chart, if the hygrometric values fall to the left of the free-hand-drawn curved line, a clear sky with no fog is indicated, but if to the right of the curve, fog or cloudiness is clearly indicated; furthermore, the character of fog and the approximate hour of beginning can be determined by the departure of the values from the curve. Additional charts may be prepared to show these relationships.

It will be noted that the chart is quite dependable near the middle of the curve, where most of the observations fall. The comparatively few occurrences near the ends of the curve are rather unimportant cases that either occurred late in the season or were followed by minimum temperatures slightly above 40°, and were added to show the hyperbolic trend of the curve. This chart is highly efficient for the purpose intended.

As past records show that fog occurs on a large percentage of radiation nights, there are but comparatively few occasions in a normal year when frost protection is actually needed, as fog often performs this function automatically. But it is on these few nights, if early in the season, that the growers desire to be advised. There is an occasional year when no frost damage occurs during the main producing season.

Figure 2 is a section of the thermograph trace at the temperature station of Dillard, Oreg., on two consecutive nights, showing the rising tendency in temperature after the formation of fog near or soon after midnight. A slight secondary fall occurred with the diminution of fog near sunrise.

The dew point alone will not serve to determine the occurrence of fog as accurately as it will in conjunction with the relative humidity, because in the latter case a factor of the current temperature is also introduced. For instance, an evening dew point as low as 32° may be followed by dense fog before morning if the relative humidity is comparatively high, while, on the other hand, a dew point of 45° may not cause fog if the relative humidity is low. This inverse relationship is well shown in Figure 1.

MINIMUM TEMPERATURE FROM FORMULA

When it is evident that the sky will remain clear throughout the night, the ensuing minimum temperature is determined by use of a hygrometric formula developed after the Young method (*1*) (*2*), which has proven quite successful; but the result is checked against a Nichols free-hand curve (*3*) on a hygrometric dot chart based on a long period of record, and in some instances a further slight correction is made.

MINIMUM FROM CURRENT TEMPERATURE

In this locality the 5 p. m. temperature alone, as proposed by Nichols (**4**), does not seem to be a reliable index to the morning minimum; the moisture factor must be given much weight. Minimum temperatures of 32° or below have occurred frequently on radiation nights with the 5 p. m. temperature varying on different occasions from 45° to 75°. An interesting instance occurred on September 6, 1929; the temperature at 5 p. m. was 80°, the dew point 30°, and the relative humidity 17, but before morning the temperature had fallen to 42° at the Weather Bureau, causing a light frost with some damage to melon foliage in the low valley sections. This range in temperature was caused by cooling from local radiation under favorable conditions of low humidity and practically no wind, calm having been recorded for five consecutive hours after midnight.

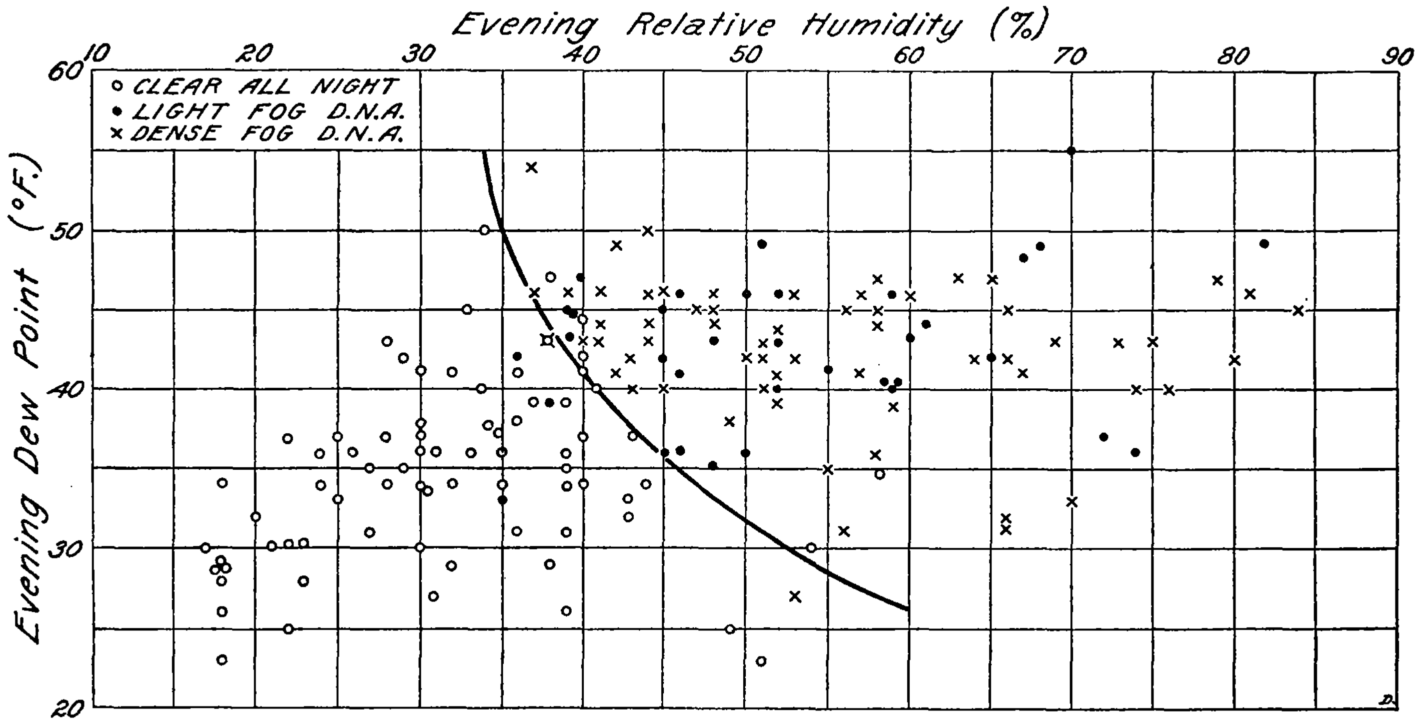

FIGURE 1.—Relationship between the 5 p. m. dew point and relative humidity to the state of the ensuing weather—whether clear all night or fog after midnight—on radiation nights at Roseburg, Oreg., during the fall season of September, October, and part of November for the years 1909-1930, when ensuing minimum temperature was 40° or below. The curve separates hygrometric data when the weather remained clear all night from those when fog occurred

VARIATION FROM WEATHER BUREAU KEY STATION

Minimum temperatures on clear nights in the melon districts have been found to be from 6° to 8° lower than at the Weather Bureau key station. However, the variation is somewhat irregular, depending upon local conditions, but as a general rule, when a minimum of 40° or lower is expected at the Weather Bureau, frost will occur along the lower river bottom lands, provided in all cases fogs do not form during the night. As yet no extensive temperature survey has been made of the district. Thermographs have been exposed only during two frost seasons at two stations in separate regions. Some variation in temperature between these stations has been noted on nights with varying local fog conditions.

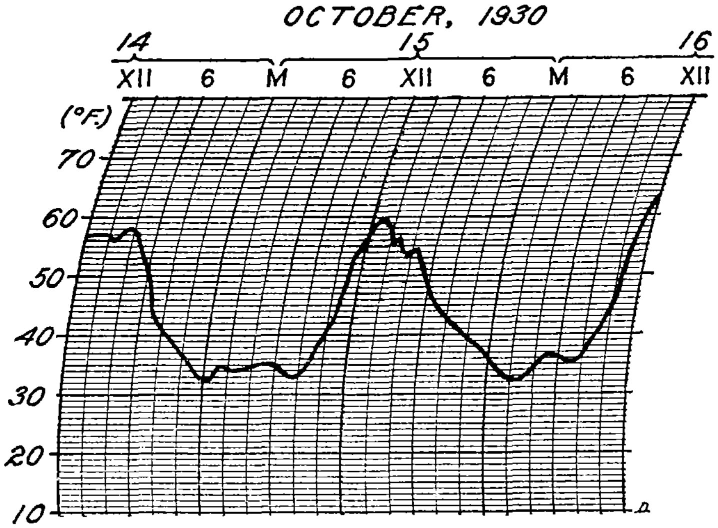

FIGURE 2.—Thermograph trace, Dillard, Oreg., October 15–16, 1930, showing the effect of fog in retarding temperature fall

VALUABLE AID AT PLANTING TIME

Another important service that the Weather Bureau renders the melon industry is at planting time in the early spring, when the weather is still much unsettled. As cantaloupe seed will germinate only under favorable weather conditions, planting must be avoided just previous to a cold, rainy period or one with strong, drying northerly or easterly winds. The kind of weather that is expected to prevail not only determines the time but also the depth the seed should be planted for best results. The growers state that the availability of this service has done much to take one of the major risks of melons in the Umpqua Valley—that of uncertain stands—from the industry. The crop must be started as early as possible after the frost danger is past in the spring in order that the maturing season may be well advanced before the coming of cooler fall weather, with its possibility of frost. Hence, frost protection in the spring is not a factor to be considered.

The aid the Weather Bureau has been able to give the melon growers has played no little part in the development of this rapidly expanding industry in this valley.

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WEATHER CONDITIONS AFFECTING THE PORT OF NEW ORLEANS

By W. F. McDONALD

[Weather Bureau, Washington, May, 1931]

Out of a number of years' experience with the public contacts of the Weather Bureau Office at New Orleans in connection with requests for information about weather and climatic conditions, I have formed some judgments regarding those features of the climate that appear to be of most practical concern to the business of the port. A detailed discussion of the records supporting these judgments can not be presented at this time, but the following general statements may have suggestive value.

1. General weather conditions, especially with respect to wind and fog, are decidedly favorable to commerce through the port of New Orleans. Average wind velocities are low, only 7.5 miles per hour for the year, and less than 9 miles per hour in March, the month of highest average wind. Maximum velocities exceed 26 miles per hour on an average of only 15 days per year, and maximum velocities of 45 miles per hour have been exceeded in only 2 of the 12 months, namely, August and September, when tropical storms have caused storm conditions producing higher wind velocities. Fog frequency affecting the water front is not fully represented by the records taken at the Weather Bureau office, but fogs of a duration sufficient to delay commerce more than a day are of relatively infrequent occurrence, and accidents due to fog are uncommon. River fogs are of somewhat greater frequency and duration than those which occur at moderate distance from the river, because the cold water coming down from the north during spring months contributes to highly localized fog formation when warm waves bring moist southerly currents inland from the Gulf to be chilled on contact with the cold river surface. The shallow nature of this localized river fog permits shipping to be moved at times from masthead lookout when dense fog conditions prevail at the level of the deck. Most cases of fog delay are measured in terms of a few hours only.

2. Examination of the records of storms affecting the port of New Orleans indicates that tornadoes are relatively unimportant—indeed, almost unknown. Only one authentic tornado has occurred in the immediate vicinity in 25 years, the one case being in October, 1906, when damage estimated at $300,000, with 21 persons injured, but no deaths, occurred in a tornadic path 4 miles long. Local storms of damaging violence, several of which may have been very small tornadoes or incipient tornadoes, have been recorded on seven other dates in 35 years of records for that vicinity, with damages running over $25,000 in only three of the seven cases.

Ten tropical cyclones are recorded in the Gulf region in 25 years, but only a few of these storms have directly affected the port of New Orleans to more than very minor degree. Shipping bound to or from New Orleans has been lost in a few instances; however, the losses at sea in this period have been remarkably few in the Gulf region, and I dare say less in proportion than the losses to North Atlantic commerce due to extratropical storms.

Only two storms in the weather history of the port of New Orleans during the last 35 years have been weather events of serious magnitude. The greatest damage resulted from the tropical hurricane of September 29, 1915, with an earlier severe but less damaging hurricane of September 20, 1909. Even in these cases, however, the principal maritime losses were confined to the smaller craft, such as tugs, barges, derricks, small river steamers, etc.